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5.—Some Interesting Stomatapoda—mostly from Western Australia

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Twenty-five species of stomatopods are dealt with, stress being laid upon geographical distribution. Additional localities are given for eight species previously known from Western Australia, together with eight new records for Western Australia, one new record for Lord Howe Island, and three for Australia.

Three species are recorded from Christmas Island (Indian Ocean) and one from the Molluccas.

Squilla microphthalma H. Milne Edwards is redescribed and *Lysiosquilla brazieri* Miers resurrected as a subspecies of *L. latifrons* (de Haan).

Introduction

Since the publication of a check list of the Australian stomatopods (Stephenson and McNeill 1955) and a recent short note (Stephenson 1960) additional specimens from five main sources have been examined:—

(a) extensive collections from the Western Australian Museum, Perth;
(b) a few specimens from the Australian Museum, Sydney, sorted from general collections made in North Western Australia;
(c) specimens recently obtained in Eastern and Northern Australia;
(d) a small collection from Christmas Island in the Indian Ocean; and
(e) the small series of stomatopods in the Macleay Museum (University of Sydney).

In reporting upon these, specimens falling within the known limits of distribution have been omitted unless of special interest. The following categories are considered separately below:—

(a) species whose known distribution has been extended;
(b) new Australian records; and
(c) redescribed species.

In this paper, lengths are measured in a mid-dorsal line from the posterior end of the telson (as near practicable, excluding spines) to the anterior edge of the carapace excluding the rostrum.

Extensions to Ranges

In general, only brief literature citations are given, these being adequate for identification. Fuller references and details of the known Australian distributions are given in Stephenson and McNeill (1955).

Squilla fabricii Holthuis, 1941, pp. 249-53, text-fig. 1.

One, Macleay Museum, labelled "Molluccas". The species is known from very few specimens from the erstwhile Dutch East Indies.

Squilla granti Stephenson, 1953, pp. 201-8, Fig. 1A-D, Fig. 2A, B, D, F. G.

Two, Port Walcott, W. Australia, 8 fm, sand with occasional sponges and corals, coll. R. D. Royce ("Davena"), 3/vi/1960, W. Aust. Mus. Reg. No. 20 (b)-61.

Two, 4-5 miles from Urquhart Point, 3-3½ fm, Westminster dredging, Weipa, Emberley River, Gulf of Carpentaria, Queensland, coll. G. Webster, 1/vii/1961, Aust. Mus. Reg. No. P12543.

Previously known only from Queensland. The present specimens differ from the original material (Stephenson 1953) in certain minor respects, e.g., more pigmented. Black pigment lines the gastric grooves of the carapace and is present on the outer uropod. Here diffuse patches occur on the distal portions of the penultimate segments and on the proximal portion of the ultimate segments.

Squilla incrnata Tate. Kemp, 1913, pp. 70-2, Pl. V, Figs. 57-9 (as *S. oratoria* var *perpensa*).

Two, Entrance Point, Broome, W. Australia between tides on rocky reef shore, Aug. 1929, coll. A. A. Livingstone, Aust. Mus. Reg. No. P13545.

New record for Western Australia.

Squilla laevis Hess. Kemp, 1913, pp. 49-50, Pl. III, Figs. 35-7.

The Western Australian Museum collections include:—

One, Exmouth Gulf, W. Australia, trawled, coll. R. McKay, M.V. "Lancelin", Oct. 1958, Reg. No. 8-61.

Two, 40 miles S.W. of Carnarvon, Shark Bay, W. Australia, trawled, coll. via. A. Snell, June, 1960, Reg. No. 42-61.

The Australian Museum collections include:—

One, between Broome and Wallal (Ninety Mile Beach), W. Australia, dredged about 7 fm, coll. R. Bourne, Reg. No. P10016.

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The species is recorded from Queensland, New South Wales, Victoria, South Australia and Western Australia. The present records extend the northern range in Western Australia, just as recent collecting has extended the Queensland range (Stephenson 1960).

Squilla mcneilli Stephenson, 1953, pp. 213-8, Fig. 4A-F.

Dr. A. A. Racek reports (in correspondence):— "This species has been found very commonly between about 60 to 120 fathoms in an area stretching from about due east of Barranjoey Lighthouse (Hawkesbury River) to due east of Stockton, and in fact it has been so common that I did not suspect it being an unusual species at all . . . . . Whatever the optimal depth of this species might be, *S. mcneilli* does not seem to occur at all this side of 100 m or 50 fathoms." Eleven species collected in the above area, 3rd-9th July, 1959, were kindly forwarded by Dr. Racek.

The majority of specimens had raptorial dactyli with six teeth not five as in the type material. Some specimens had six teeth on one claw and five on the other.

The species had been recorded off the New South Wales coast from Newcastle to Green Cape in 25-90 fm.

Squilla miles Hess. Hale, 1924, pp. 492-5, Pl. XXXII, Fig. 1, text-fig. 381a-i.

One, near Albany, Cape Riche, W. Australia, herring net, coll. A. Kalnins, March, 1954, W. Aust. Mus. Reg. No. 38-61.

Juvenile (30mm), Shark Bay, W. Australia, night drift, M.V. "Lancelin", 31/iii/1957, W. Aust. Mus. Reg. No. 9-61.

Two, 4 Mile Reef off Busselton, 60 ft, stomach of fiddle-ray, coll. B. Wilson, 28/xii/1958, W. Aust. Mus. Reg. No. 46-61.

Common on the southern shores of Australia. Previously recorded from Western Australia (but from an unknown locality) by Alexander (1916*a*), from Cottesloe by Hale (1929*b*) and from Albany by Stephenson and McNeill (1955). The present records extend the northern range of the species, particularly since Hess' (1865) locality of "Sydney" is suspect (see Stephenson and McNeill 1955).

Squilla raphidea Fabricius. Kemp, 1913, pp. 88-92, Pl. VII, Fig. 77.

One, Wyndham, W. Australia, coll. R. G. Patterson, 1956, W. Aust. Mus. Reg. No. 170-56.

New record for Western Australia, previously known from the Northern Territory, New South Wales and Queensland.

Squilla terrareginensis Stephenson, 1953, pp. 208-13, Fig. 3A, B.

Male, Carnarvon, W. Australia, off reef, N. Paul via P. Crackel, Feb. 1962, W. Aust. Mus. Reg. No. 148-62.

Known previously only from the type material from N. Queensland.

Lysiosquilla multifasciata Wood-Mason. Chopra, 1939, pp. 162-5, Figs. 8, 9.

Two, Barred Creek, 40 miles N. of Broome, W. Australia, mangrove flats, low tide, coll. A. Kalnins, 5-10/i/1960, W. Aust. Mus. Reg. No. 35-61.

One, Port Walcott, W. Australia, 8 fm sand with occasional sponge and corals, coll. R. D. Royce ("Davena"), 3/vi/1960, W. Aust. Mus. Reg. No. 20 (d)-61.

New records for Western Australia. Only one specimen was previously known from Australia, from Dunk I., Family Group, Queensland.

Lysiosquilla osculans Hale, 1924, pp. 501-2, Pl. XXXIII, Fig. 3, text-fig. 384 (as *Lysiosquilla vercoi* var *osculans*).

Two, Cottesloe, W. Australia, from gullet of flounder, coll. D. Diamond, 1940, W. Aust. Mus. Reg. No. 14/15-40.

New record for Western Australia, previously known only from Victoria and South Australia.

Pseudosquilla ciliata (Fabricius). Kemp, 1913, pp. 96-100. Bigelow, 1931, pp. 152-6, text-figs. 3-6. Dollfus, 1938, pp. 198-200, Fig. 8 (with synonymy).

A single specimen is present in the Macleay Museum labelled "Lord Howe Island."

Within Australia previously recorded only from Queensland.

Pseudosquilla ornata Miers. Kemp, 1913, pp. 100-1. Komai, 1927, pp. 324-5, Pl. XIV, Figs. 2-2b.

One, Christmas I., coll. E. Carr, July, 1961, W. Aust. Mus. Reg. No. 110-61.

A widespread Indo-West Pacific species, apparently never common, and not so far recorded from Australia.

Gonodactylus chiragra (Fabricius). Kemp, 1913, pp. 155-62, Pl. IX, Fig. 107, Fig. 2 on p. 161. Dollfus, 1938, pp. 205-13, text-figs. 14, 15 (with synonymy).

This widely distributed species is represented in the Western Australian Museum by collections from:—

Yampi Sound; Point Ganthcaume; Broome; Port Hedland; Delambre I., Enderby I. (Dampier Archipelago); Point Cloates; Maud Landing; Carnarvon; Cape St. Cricq; Cape Inscription; North I., Rat I. and Gun I. (Abrolhos Group); Quobba; Dixon I., Nichol Bay; and also from Christmas I.

Previously recorded in Western Australia by Miers (1880*b*) from Swan River and the Abrolhos, by Pocock (1893) from Baudin I., Troughton I., Damma I., and Baleine Bank, by Alexander (1916*a*, *b*) from Port Hedland, and by Balss (1921) from the Cape Jaubert vicinity.

Gonodactylus falcatus (Forskål). Kemp, 1913, pp. 167-9, Pl. IX, Fig. 113, text-fig. 2 (as *G. glabrous* Brooks). Dollfus, 1938, pp. 217-222, figs. 18-20 (as *G. glaber* Brooks, with synonymy).

This widely distributed species is represented in the Western Australian Museum collections by specimens from:—

Yampi Sound; Thevenard I.; Shark Bay; and Cockburn Sound. It has been recorded from Shark Bay by Alexander (1916*a*) and Dirk Hartog I. by Hale (1929*b*).

Gonodactylus graphurus Miers. Kemp, 1913, pp. 169-71, text-fig. 1 on p. 170.

This widely distributed species is represented in the Western Australian Museum collections by specimens from:—

Broome; Port Hedland; Malus I., Gidley I., and Mermaid Straits (Dampier Archipelago); Wreck Point, Abrolhos Is.; and Port Walcott. Previously recorded in Western Australia from Nichol Bay by Miers (1880*b*), from N.W. Australia, Baudin I., and Baleine Bank by Pocock (1893) and from the Cape Jaubert vicinity by Balss (1921).

Gonodactylus pulchellus Miers. Kemp, 1913, pp. 177-9, Pl. X, Figs. 117-8. Dollfus, 1938, pp. 224-6, Fig. 22 (with synonymy).

Two off Ganthcame Point, Broome, W. Australia, dredged 4 fm, Aug. 1929, coll. A. A. Livingstone, Aust. Mus. Reg. No. 13544.

One, 25 miles N.W. of Angel I., Dampier Archipelago, W. Australia, "Honolulu" dredge, 37 fm, sand, coll. R. D. Royce ("Davena"), 2/vi/1960, W. Aust. Mus. Reg. No. 18-61.

New record for Western Australia, with only two previous Australian records, from Princess Charlotte Bay and Hayman Island, both in Queensland.

Gonodactylus stoliurus (Müller). Kemp, 1913, pp. 184-5.

One, Maud Landing, N.W. Australia, 10 fm, weed and sand on rock, "Honolulu" dredge, coll. R. D. Royce ("Davena") 20/v/1960, W. Aust. Mus. Reg. No. 10-61.

One, 5 Mile Fence, S. of N.W. Cape, W. Australia, reef at low tide, coll. R. George and P. Cawthorn, 3/iv/1961, W. Aust. Mus. Reg. No. 52-61.

According to Pocock (1893), Hansen considered that Miers' (1880*b*, c) record of *G. trispinosus* from Shark Bay refers to the present species. *G. stoliurus* has been recorded from Lancelin Is., Western Australia (Stephenson and McNeill 1955).

Gonodactylus trispinosus Dana. Borradaile, 1898, p. 33, Pl. V, Figs. 1, 1a (as *Protosquilla trispinosa*). Kemp, 1913, pp. 180-1.

One, with malformed telson, N.E. of Malus I., Dampier Archipelago, W. Australia, 10 fm, "Honolulu" dredge, coll. R. D. Royce ("Davena"), 31/v/1960, W. Aust. Mus. Reg. No. 13 (b)-60.

The left half of the central portion of the telson is deformed and bent ventrally, giving a wider than normal separation between right and left halves, with resultant difficulty in keying the specimen.

Recorded previously from W. Australia as follows:—

Swan River (Miers 1880*b*), Baleine Bank (Pocock 1893) and Cape Jaubert vicinity (Balss 1921): also from Queensland (Hale 1929*a*, Stephenson and McNeill 1955). Nevertheless sufficiently uncommon to be worthy of mention.

The specimen from Swan River mentioned by Miers (1880*b*, c) was evidently White's (1847) type. Although *G. trispinosus* White 1847 is a *nomen nudum* (see Kemp 1913, p. 180), the name *G. trispinosus* was evidently first applied to this Western Australian specimen (see Miers 1880*b*, *c*). Two further Western Australian specimens referred by Miers (1880*b*, *c*) to the present species are now regarded as *G. stoliurus*.

Odontodactylus cultrifer (White). Kemp, 1913, pp. 137-8, pp. 138-9 (as *O. carnifer* (Pocock)).

Two, W. side, Exmouth Gulf, W. Australia, in trawl, coll. K. Godfrey, M.V. "Lancelin", 26/ii/1956, W. Aust. Mus. Reg. No. 41-61.

New record for Western Australia, previously recorded from Queensland.

Odontodactylus japonicus (de Haan). Komai, 1927, pp. 335-6, Pl. XIII, Fig. 2.

One, Shark Bay or Exmouth Gulf, W. Australia, trawled, coll. R. McKay, M.V. "Lancelin", June-Oct. 1958, W. Aust. Mus. Reg. No. 14-61.

Alexander's (1916*b*) record from Broome, Western Australia was queried by Stephenson and McNeill (1955), but since the species is now known from Western Australia and from the Capricorn Group, Queensland (Stephenson 1960), this querying appears unjustified.

Odontodactylus scyllarus (L.) Kemp, 1913, pp. 135-7. Komai, 1927, pp. 335-6, Pl. XIII, Fig. 2.

One, Christmas I., coll. E. Carr, July, 1961, W. Aust. Mus. Reg. No. 111-61.

While widespread throughout the Indo-West Pacific area, this species nowhere appears common. A specimen from Wewak, New Guinea, was recently received at the University of Queensland.

New Australian Records

Squilla gonypetes Kemp 1911

Squilla affinis Pocock, 1893, p. 474 (*partim* fide Kemp, 1913).
Squilla gorypetes Lloyd, 1908, p. 33 *(sine desc.)*.
Squilla gonypetes Kemp, 1911, pp. 96-7; 1913, pp. 54-5, Pl. IV, Figs. 42-44. Sunier, 1918, pp. 66-7. Kemp and Chopra, 1921, pp. 300-1. Hansen, 1926, p. 10. Gravier, 1938, pp. 166-8, Fig. 1. Stephenson and McNeill, 1955, p. 256 (in key).

♀ (34 mm) approx. 10 miles N. of Long I., off Onslow, W. Australia, coll. B. R. Wilson ("Davena"), 17/vi/1960, W. Aust. Mus. Reg. No. 29-61.

The pigmentation of the present specimen follows exactly that mentioned by Pocock (1893) and described by Kemp (1913). Previously the species had been recorded from Burma, the Andaman Is., Arakan Coast, Persian Gulf, Holothuria Bank (China Sea), Mergui Archipelago, the Java Seas and the Gulf of Suez, but not from Australia.

Squilla multicarinata White 1848

Squilla multicarinata White 1848, p. 144, Annulosa Pl. VI, Fig. 1, 1a; 1849, pp. 381-2. Miers 1880*a*, p. 20. Bigelow, 1895, p. 511 (in key). Nobili, 1903, p. 38. Kemp, 1913, pp. 86-8, p. 196, Pl. VI, Figs. 73-6. Sunier, 1918, p. 70. Kemp and Chopra, 1921, p. 307. Parisi, 1922, pp. 102-3. Komai, 1927, p. 322. Gravier, 1938, pp. 174-7, Fig. 4.

Damaged ♀ (estimated length *c.* 39 mm), 5 or 6 miles off Bezout I., Dampier Archipelago, W. Australia, coll. B. R. Wilson ("Davena"), 5/vi/1960, W. Aust. Mus. Reg. No. 27-61.

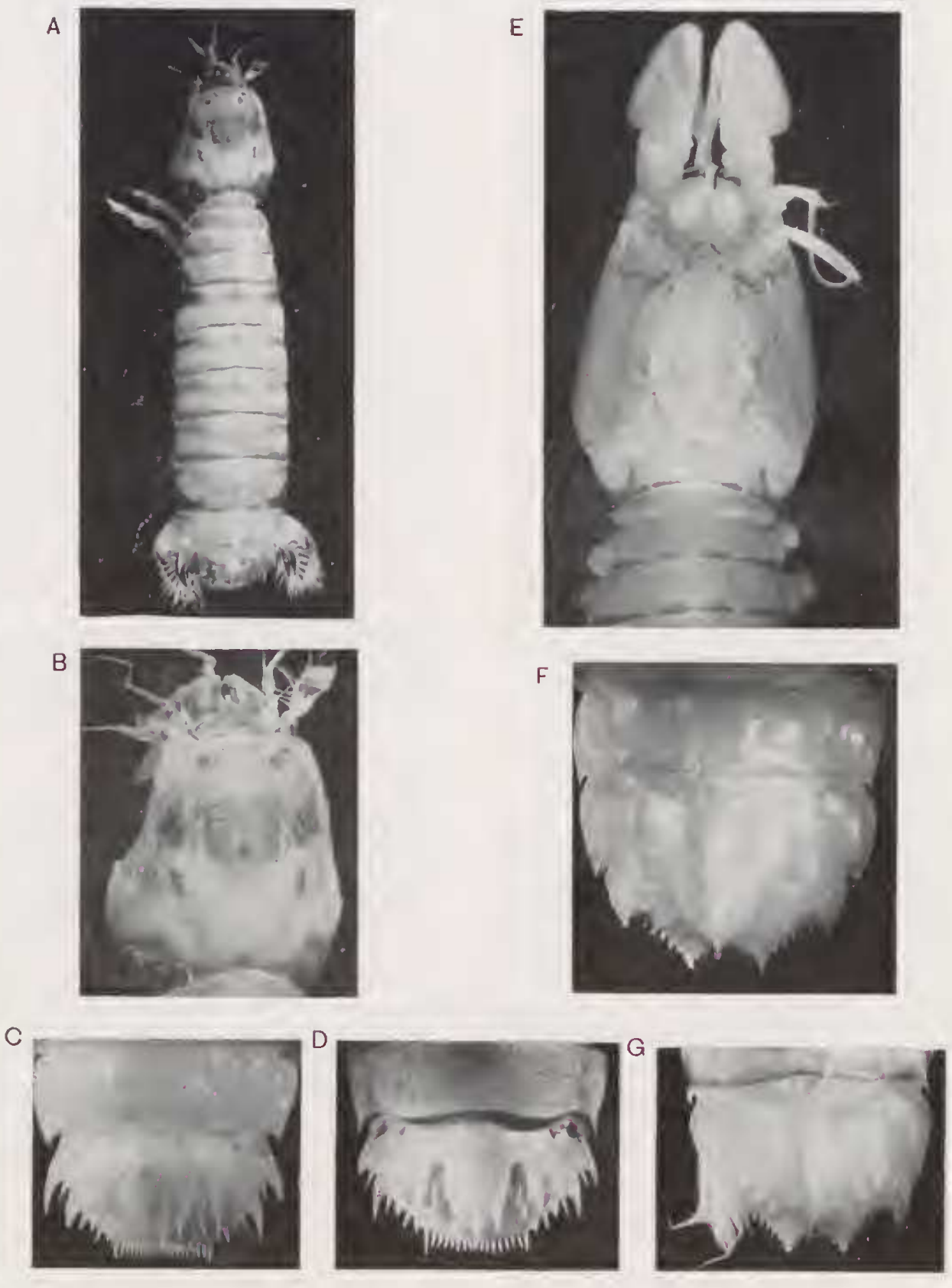

PLATE I

Figs. A, B, C, D—*Lysiosquilla latifrons brazieri.*
Fig. A.—55mm specimen (whole); Fig. B.—55 mm specimen (carapace); Fig. C.—80 mm specimen (telson); Fig. D.—75 mm specimen (telson). Figs. E, F, G—*Squilla microphthalma;* Fig. E.—32 mm specimen (carapace, etc.); Fig. F.—39 mm specimen (telson); Fig. G.—28 mm specimen (telson).

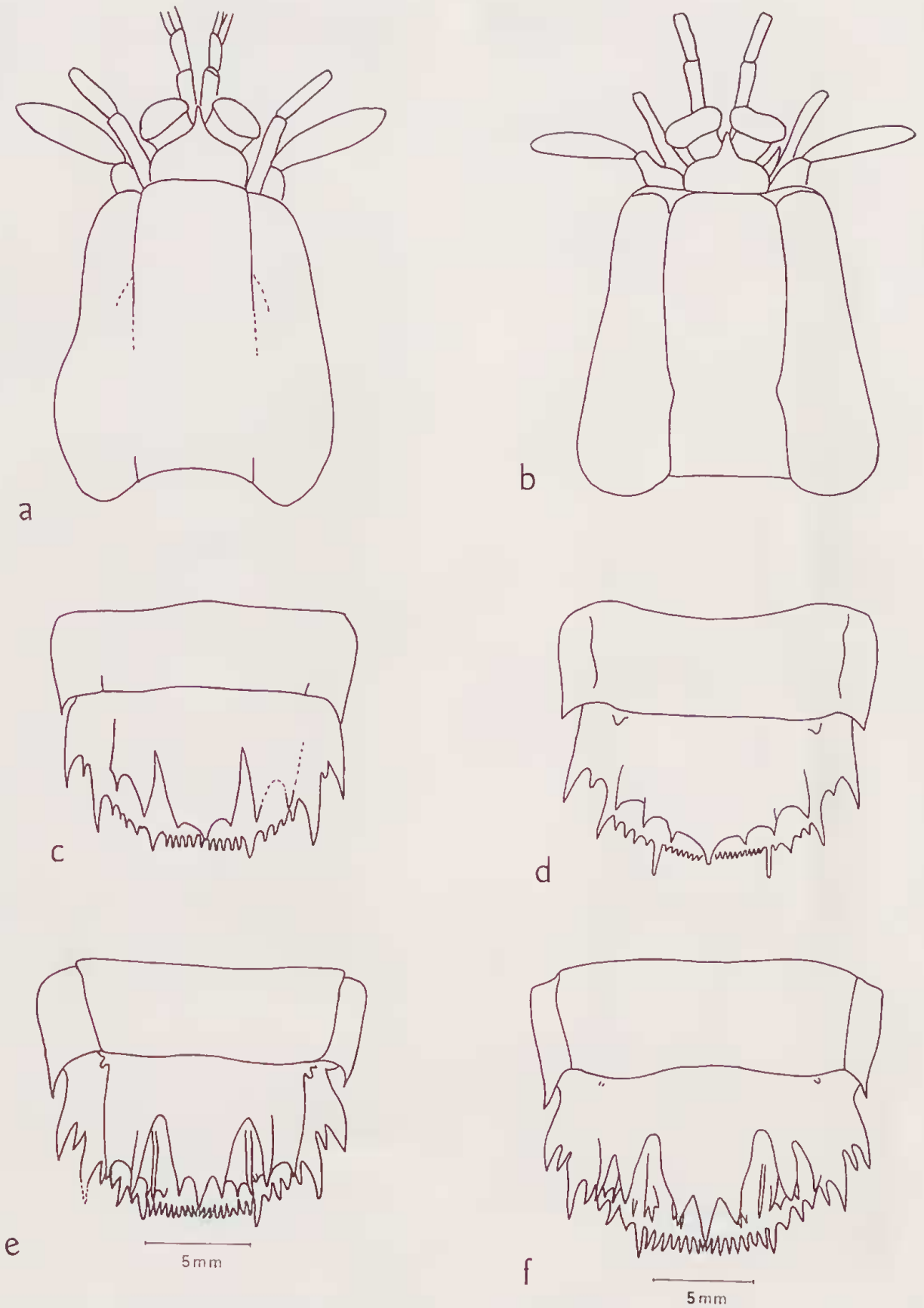

Fig. 1.—*Lysiosquilla latifrons brazieri*—a.—Carapace, etc. of *L. latifrons* after de Haan (1844); b.—Carapace, etc. of *L. latifrons* after Komai (1927); c.—Telson of *L. latifrons* after de Haan (1844); d.—Telson of *L. latifrons* after Komai (1927); e.—Telson of 80 mm specimen; f.—Telson of 75 mm specimen.

Previously known from Japan, the Philippines. Singapore, Hongkong, Christmas I., South India (Kemp 1913), Java Seas (Sunier 1918), Singapore (Kemp and Chopra 1921), and Gulf of Suez (Gravier 1938), but not from Australia.

In the key of Stephenson and McNeill (1955), the species comes out by the following route:—1, 2, 4, 23 (first alternative). With *S. lirata* Kemp and Chopra (1921) it is distinguished by the possession of a bilobed lateral process on the sixth thoracic somite, and by the entire surface of carapace and abdomen being multicarinate. It is separated from *S. lirata* by the possession of a mandibular palp, by having five teeth on the raptorial dactylus, and by other features (see Kemp and Chopra 1921).

Redescribed Species

Lysiosquilla latifrons brazieri Miers 1880*a*
(Figs. 1e, 1f; Plate 1, Figs. A, B, C, D)

Lysiosquilla brazieri Miers, 1880*a*, p. 11, Pl. I, Figs. 3-6; 1880*b*, p. 125. Haswell, 1882, p. 206. Bigelow, 1893, p. 503 (in key). Chilton, 1911, p. 139.

Lysiosquilla latifrons (de Haan). Kemp, 1913, pp. 128-9 *(partim)*. Stephenson and McNeill, 1955, p. 248.

non *Squilla latifrons* de Haan, 1844, Pl. LI, Fig. 3; 1849, p. 222.

non *Lysiosquilla (Coronis) latifrons* (de Haan). Miers 1880*a*, pp. 10-11.

non *Lysiosquilla latifrons* (de Haan). Rathbun, 1902, p. 54. Komai, 1927, pp. 333-5, Pl. XIV, Figs. 3, 3a, 3b.

Discussion of Synonymy

Miers' original description, based upon a female specimen from New South Wales, distinguished *L. brazieri* from *L. latifrons* as follows:—(a) having six teeth on each raptorial dactylus instead of seven, (b) having a telson armed with more numerous spinules (*c.* 14), (c) not possessing a median sinus on the telson, and (d) in having the short appendages of the last pair of thoracic limbs almost linear.

These distinctions have been shown to have no taxonomic value.

(a) Rathbun (1902) noted that de Haan's original description of *S. latifrons* from Japan did not conform with his figure, where six teeth are shown on the right raptorial dactylus. Also her own Japanese specimen possessed six teeth on each dactylus. The same applies to the Japanese specimen described by Komai (1927).

(b) Rathbun (1902) noted in her Japanese specimen that the telson bore 12 small spines on one side and 11 on the other, and later Chilton (1911) noted upon New Zealand specimens of *L. brazieri* that there were only 10 spinules upon each side of the telson.

(c) The absence of a median sinus is of little value, because Chilton's material had "a slight indication of a sinus on the posterior margin of the terminal segment".

(d) Kemp (1913) inferred that a linear short appendage on the last pair of thoracic limbs was present in de Haan's species, and this is confirmed by Komai's (1927) description.

The described distinctions between Miers' and de Haan's species are invalid and all recent workers have relegated Miers' name to the synonymy (Chilton 1911, Kemp 1913, Komai 1927, and Stephenson and McNeill 1955).

However, certain other characteristics are of possible taxonomic value. These are colour, and ornamentation of the telson.

Colour.—Two freshly collected specimens from the New South Wales/Queensland border waters showed constant colour differences as compared with the Japanese specimen described by Komai. Certain of these differences were visible even in an old dried specimen from Port Jackson in the Australian Museum.

Ornamentation of the telson.—There are constant differences between the Australian material and the Japanese.

To date only three Japanese specimens have been reported in the literature (de Haan's, Rathbun's, and Komai's), plus two from New Zealand (Chilton's—omitting the numerous washed up specimens which were not retained), and two from Australia (Miers', and that of Stephenson and McNeill which is relisted below). Attempts have been made to obtain material from New Zealand (particularly Chilton's specimens) but these have failed. Until more material has been examined it must remain uncertain whether there are intergrades in colouration and telson ornamentation between the Northern and Southern Hemisphere forms. On the present inadequate data the two forms appear to be separate both geographically and morphologically, although the structural differences are much less than usually found between stomatopod species. For these reasons Miers' species is revived and given subspecific status.

Material Examined

♀ (75 mm), Port Jackson, N.S. Wales, coll. Mr. Tiley, dredge "Samson", Aust. Mus. Reg. No. P5487. (Note: the abdominal segments are telescoped in this dried specimen, which is considerably the largest of the three examined.)

♀ (80 mm), of Tweed Heads, Queensland/N.S. Wales border, prawn trawled on clean sand in 20 fm, 11/iii/1961, coll. W.S. (*Squilla laevis* was the dominant stomatopod in the collection). (Note: left raptorial claw missing; specimen to be deposited in the Australian Museum.)

♀ (55 mm), off Kingscliff, Northern N.S. Wales, in prawn trawl at 31 fm, June, 1961, coll. L. Wale. (Note: both raptorial claws missing; specimen to be deposited in the Queensland Museum.)

Material Illustrated

Whole specimen and carapace—55 mm specimen. Telson—80 mm specimen (Fig. 1e; Pl. 1, Fig. C); 75 mm specimen (Fig. 1f; Pl. 1, Fig. D).

Description

The present material agrees with Komai's (1927) description in all respects excepting the following:—

Colour.—In *L. latifrons* Komai describes the carapace as "marked with three dark bands rather obviously defined". In the present specimens the posterolateral areas of the carapace are conspicuously sooty black while the anterior halves are diffusely mottled and spotted with black to a definite pattern (see Pl. I, Figs. A, B). The central of Komai's three dark bands

is represented only by two dark spots. Additional darker pigmented areas on the Australian specimens comprise—the anterolateral portions of the first abdominal somite and the endopodite of the uropod. The latter carries a central paler line.

Telson.—Komai deseribes this as "nearly as long as broad" but in his figure, and also in de Haan's, and in the present speeimens it is about half as long as broad.

Komai described the ornamentation of the dorsal surface of the telson as follows:—". . . . . set with a row of seven acute spines situated at equal intervals near the posterior margin; of these spines the median somewhat surpasses the rest in thickness; the other three pairs are gradually longer outwards; the submedian and intermediate spines as well as the latter and the lateral spine, are interposed each with a shallow longitudinal furrow, while sueh a furrow does not exist between the submedian spines and the median spine, so that the median three spines make one group, and the lateral four are separated from the other." Komai's description agrees closely with de Haan's original figure of the telson (see Figs. 1c, 1d).

In the present material Komai's seven acute spines are present, with a similar central grouping of three, and with four more lateral spines. However, the intermediate spines are separated from the submedians by a broad and fairly deep excavation typically bearing additional spines. The laterals are separated from the intermediates by an almost equally broad, but typically shallow exeavation. These features are clearly shown in Miers' figure on *L. brazieri* (Miers 1880*a*, Pl. I, Fig. 3). On a lower level than the above large spines, and slightly posterior to them (but still well forward of the terminal spinulation) further spinules or spines are present, either as rows or reduced to isolated spines (see Figs. 1e, 1f; Pl. I, Figs. C, D).

The following variations in spinulation of the dorsal surface of the telson oecur in the present material:—

75 mm specimen.—Left space between submedian and intermediate dorsal spines with one spine and a spinule, right space with a tuberele and an elongated spine. Two confusedly arranged lower rows of spines are present, comprising 11 spines.

80 mm specimen.—Spaees between submedian and intermediate dorsal spines eaeh with a long spine. On the left there are two smaller spines, and on the right a single smaller spine, these corresponding to the lower rows of the above specimen.

55 mm specimen.—As 80 mm specimen exeept single lower spine or spinule on each side.

The numbers of smaller spines on the posterior margin of the telson between the mobile submedians are as follows:—75 mm speeimen—8 spines and one minute spinule on either side of the mid line; 80 mm speeimen—9 spines on eaeh side with a minute spinule just left of centre; 55 mm specimen—9 spines on each side. Miers' figure of *L. brazieri* (1880*a*, Pl. I, Fig. 3) shows about 7 spines on either side (total c. 14) not 14 on either side as Chilton inferred. Chilton's own material had 10 spines on either side. These numbers overlap with those of *L. latifrons* from Japan, which are evidently at least equally variable.

In dorsal view the lateral margins of the earapaee in *L. latifrons* have been figured as rounded by de Haan (see Fig. 1a), and relatively straight by Komai (see Fig. 1b). In the present specimens they are rounded (see Pl. I, Figs. A, B).

Squilla microphthalma H. Milne-Edwards, 1837
(Figs. 2a, 2d; Plate I, Figs. E, F, G)

Squilla microphthalma, H. Milne-Edwards, 1837, p. 523. de Haan, 1849, p. 221. Bigelow, 1895, p. 509. Jurich, 1904, pp. 368-9, Pl. XXVI, Fig. 1. Kemp, 1913, pp. 31-3, Pl. I, Figs. 17-20. Kemp and Chopra, 1921, pp. 299-300. Serène, 1952, pp. 5-11, text-figs. 10, 11, 16, 17, 20; Pl. I, Figs. 2, 5; Pl. II, Figs. 2, 5 (under *S. depressa*).

Chlorida microphthalma (H. Milne Edwards). Eydoux and Souleyet, 1841, pp. 264, 266 (fide Kemp 1913—not seen).

Chloridella microphthalma (H. Milne-Edwards). Wood-Mason, 1895, p. 8, Pl. IV, Figs. 1-5. de Man, 1898, pp. 691-3, Pl. 38, Figs. 76, 76a.

non *Chloridella microphthalma (depressa)* Miers 1880*a*, p. 14, Pl. II, Figs. 1-4 (= *S. depressa* Miers)).

non *Chloridella microphthalma* Haswell, 1882, p. 207 (= *S. depressa* (Miers)).

Discussion of Synonymy

Serène (1952) has shown that previous records of *S. microphthalma* from Australia refer to *S. depressa* Miers. In comparing these two speeies he redescribed *S. microphthalma* on the basis of two speeimens from Indo China, and illustrated the speeies extensively. The present material differs from Serène's redeseription of *S. microphthalma* in several partieulars, including:—

(a) carapaee shape, with a broader front and less inelined margins (compare Fig. 2a and c);

(b) shape of rostrum, shorter (compare Fig. 2a and c);

(c) number of denticles between submedian marginal teeth of telson, with 3-4 pairs (typically 4) as against 2 pairs; and

(d) shape of bifurcate process of the uropods.

In the present speeimens the process is relatively stouter, and with a more clearly sinuous eurve in front of the external lobe of the longer spine (compare Fig. 2d. and f).

Serène's figured specimens elosely resemble Jurich's from Zanzibar, while the present specimens closely resemble Kemp's from Karachi and Madras and de Man's from Indonesia.

The differences between these two groups of specimens lie within the range to be expected within a stomatopod speeies, particularly since Serène and Jurieh had relatively large specimens (lengths 85 mm and 67 mm respectively). This conclusion has been reinforeed by examination of a specimen from Zanzibar kindly forwarded by Dr. A. J. Bruce. The specimen (♂, 4.2 mm) bears the following habitat data—"outflow of mangrove swamp, thick blaek mud, trawled 5 fms, Mto Zingwe Zingwe, Zanzibar

Island, 4/vii/1961." This specimen is intermediate between Serène's and the Australian material as follows:—(a) resembles Serène's in having a long rostrum and having only two pairs of denticles between the submedian teeth of the telson and (b) resembles the Australian material in the relatively broad and slightly inclined margins of the carapace, and in the shape of the bifurcate process of the uropods (although the external lobe is less strongly developed).

Material Examined

♂ (20mm) Roebuck Bay, W. Australia, between tides on flats, 8/viii/1929, coll. A. A. Livingstone, Aust. Mus. Reg. No. P13540.

♂ (32 mm), ♀ (39 mm) Roebuck Bay, W. Australia, between tides sand flat, 8/viii/1929, coll. A. A. Livingstone, Aust. Mus. Reg. No. P13541.

♂ (28 mm) W. side Fort Hill, Port Darwin, N. Territory, between tides, coll. A. A. Livingstone, Aust. Mus. Reg. No. P13542.

Material Illustrated

Carapace etc.—32 mm specimen. Telson—39 mm specimen (Pl. I, Fig. F) and 28 mm specimen (Pl. I, Fig. G). Front end of carapace and rostrum—39 mm specimen (Fig. 2a). Bifurcate process of uropod—32 mm specimen (Fig. 2d).

Description

Eyes.—Eyestalks short and broad, length approximately three-quarters that of the basal segment of the antennular peduncle, maximum breadth about 50 per cent. of or slightly more than 50 per cent. of combined length of stalk and eye. Cornea black, indistinctly bilobed, with the maximum breadth of the cornea in a dorsolateral direction being about one third maximum length. Inner margins of the eyestalks in juxtaposition for about half their length, thereafter diverging quite strongly (in this last respect, they resemble those of *S. latreilli* (Eydoux and Souleyet) sec Serène, 1952, Pl. I, Fig. 1 and *S. decorata* (Wood-Mason) sec Kemp, 1913, Pl. I, Fig. 13).

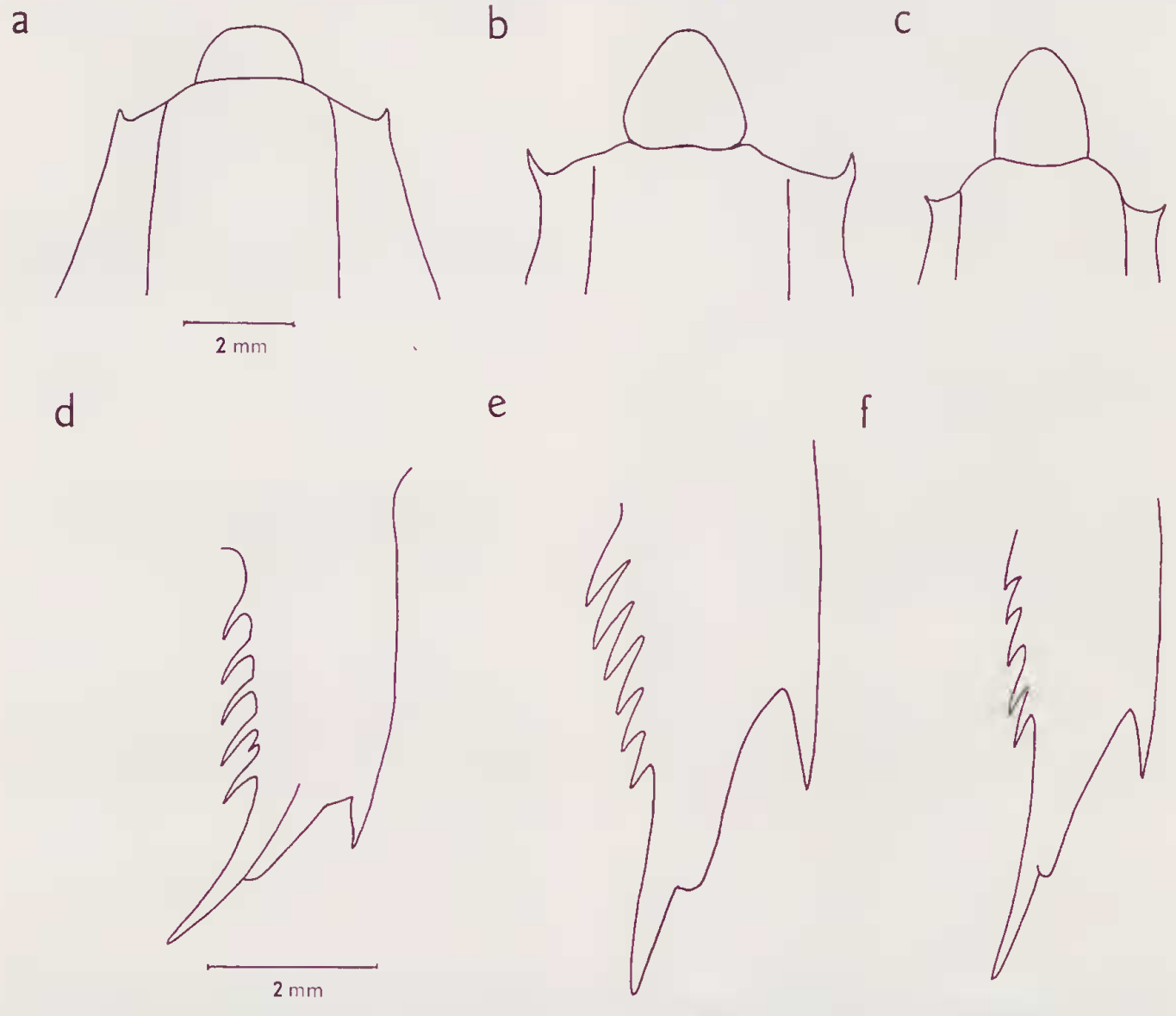

Fig. 2.—*Squilla microphthalma*—a, b, c.—Rostrum and anterior part of carapace; a, 39 mm specimen; b, after de Man (1898); c, after Serène (1952). d, e, f.—Bifurcate process of uropod; d, 32 mm specimen; e, after Kemp (1913); f, after Serène (1952).

Antennules.—Peduncle approximately two-thirds the combined lengths of the carapace and rostrum.

Antennae.—Basal segment together with proximal segment of exopodite slightly shorter than the length of the distal segment (scale) but not reaching to the middle of the eyes. Peduncle of endopodite c. 1.4 times the length of the antennal scale (excluding bristles) and equal to or slightly longer than the anterior breadth of the carapace.

Mandibular palp.—Present, three segmented in all but the smallest specimen, here apparently two segmented.

Rostrum.—Semi-elliptical (length about 60 per cent. of breadth) to semi-circular.

Carapace.—Maximum breadth slightly less than the length (excluding the rostrum) and double the minimum breadth behind the antero-lateral angles. Anterior borders between the rostrum and the anterolateral angles distinctly inclined posteriorly. Anterolateral angles each with a well-developed spine. Lateral borders straight in their anterior three-quarters, with smoothly rounded posterior angles and smoothly concave posterior border.

Cervical groove distinct, gastric groove distinct anterior to the cervical groove, but less distinct posterior to it. No trace of median, intermediate or lateral carinae, nor of marginal carinae anterior to the cervical groove. Posterior to cervical groove, marginal carinae distinct and best developed in their reflected portions. A pit present in the mid-line of the carapace about one third of the way backwards from the anterior margin. A mid-dorsal tubercle just in front of the posterior margin of the carapace.

Raptorial claws.—Articulation of ischium and merus not terminal, but slightly in advance of the proximal end of the latter. Merus massive, with concave inferior margin. Upper margin of the carpus with a single distinct curved carina running along three-quarters of its length and terminating abruptly; near the termination there is a tuft of setae. Propodus deep and swollen, bulging particularly at its carpal articulation, and with a smoothly curved lower margin. Upper margin pectinate, with setae amongst the teeth and there are the usual three stout movable spines just inside the proximal part of the upper margin. Dactylus with four spines, the terminal one being much the longest. The lower margin of the dactylus is sinuous.

Thoracic somites.—Fifth somite bearing on each side a lobe (often blunted, but acute in largest specimen) which continues ventrally as a short ridge. Sixth, seventh and eight somites bearing distinct but rounded intermediate carinae; the lateral margins carinate. No median or submedian carinae on the thoracic somites.

Sixth and seventh somites with entire and rounded borders. Lateral margin of eighth somite partly covered by a bluntly rounded anterior projection from the first abdominal somite. Endopodites of the last three thoracic appendages elongated ovoids.

Abdominal somites.—First five somites bearing distinct intermediate, lateral and marginal carinae but median and submedian carinae not present. On the sixth somite, there are submedian, intermediate, lateral and marginal carinae, the last two converging posteriorly. The following carinae end in spines, brackets indicating absence in some of the specimens:—

Carinae	Abdominal somites
Submedian	6
Intermediate	(5), 6
Lateral	—
Marginal	(4), 5, 6

Termination of marginal carina of fourth abdominal somite rarely sharp enough to be termed a "spine"; that of third somite even less spiniform.

Telson.—Broader than long (c. 1.6 times) and strongly convex. Median carina very distinct and ending in a distinct spine. A row of tubercles on each side of the carina, these rows being referred to below as submedian tubercles. Up to five tubercles present, being sometimes distinctly separate and sometimes more or less fused. The most anterior on each side comprises a broad elevated area and behind these the rows converge, sometimes terminating in a median tubercle behind the carina. Between these submedian tubercles and the marginal teeth of the telson, there are 2-4 (typically 3) obliquely pointing and elevated rounded ridges (or elongated tubercles). Up to three pairs of additional tubercles towards the margins of the telson, representing basal inflations of the carinae of submedian and intermediate teeth respectively and lying near the base of the lateral teeth. In the smallest specimen only the submedian inflations are present.

Margins of the telson ornamented as follows:—a pair of blunt submedian teeth with movable spines; between these there are 3-4 (typically 4) pairs of denticles; a pair of stout but sharp intermediate teeth separated from the submedians by 6-8 denticles on each side; and a pair of acute sharp lateral teeth separated from the intermediates by a single denticle on each side. Anterior two-fifths of margin of lateral tooth of telson with a stouter carina than the remainder which, in the large specimens, terminate in an inconspicuous prelateral denticle. As stated above the carinae of submedian and intermediate teeth are represented in the larger specimens by tuberculate carinae. These sometimes show indications of being composed of fused rows of smaller tubercles.

Under surface of the telson microscopically granular, and without a post-anal carina.

Uropods.—Bifurcated process of basal segment armed internally with 5-7 (typically 6) sharp, elongate teeth. Longer process about thrice the length of the shorter and with a basal thickening on the margin facing the shorter process. Thickened portion very conspicuous and sinuously curved.

External margin of the basal segment of the uropod bearing 5-6 (typically 6) articulating spines, the terminal much the largest. The terminal segment of the exopodite approximately $2\frac{1}{2}$ times as long as broad.

Colours after prolonged alcohol fixation:—General colour of larger speciments biscuit, but raptorial claws ivory coloured. Typically with numerous black or sooty brown pigmented areas of which the most conspicuous are:—(a) rostrum and anterior carapace (see Pl. I, Fig. E); (b) posterior carapace where a black line near the border continues in the anterior reflections of the marginal carinae; (c) on most of the free thoracic somites and abdominal somites where transverse lines occur near the posterior margin of each. These lines are absent on the fifth thoracic somite and typically on the sixth abdominal somite and are feebly developed on the fifth abdominal somite. There is a small black spot in the posterior medial portion of the penultimate segment of the exopodite of the uropod.

In the smallest specimen the only pigmented portion apart from the cornea consists of small dark spots near the anterolateral margins of the carapace, while in the 28 mm specimen, the first five abdominal somites bear additional diffuse spots of pigment running across each segment, and the sixth abdominal somite is pigmented as in the previous ones.

Comments

In the four individuals differences in the densities of pigmentation and the ornamentation of the telson are within the expected range of variation of a species. However the smallest specimen differs in further particulars:—(a) less curvature on the inner margins of each eyestalk; (b) in dorsal view eyestalks extending relatively forward in relation to the basal segment of the antennular peduncle. Only about one-eighth of the length of this segment projects forward beyond the eye, and (c) mandibular palp. This is proportionally smaller than in the remaining specimens, and although apparently undamaged, only two segments could be distinguished instead of three.

The species was previously known from Zanzibar, India, Indo-China and Indonesia but not from Australia.

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List of Species

References

Alexander, W. B. (1916*a*).—On a stomatopod new to Australia, with a list of the Western Australian species of the order. *J. Roy. Soc. W. Aust.* 1: 8.

Alexander, W. B. (1916*b*).—Further notes on Western Australian stomatopods. *J. Roy. Soc. W. Aust.* 1: 9-10.

Balss, H. (1921).—Results of Dr. E. Mjöberg's Swedish Scientific Expeditions to Australia 1910-13. XXIX. Stomatopoda, Maerura, Paguridea und Galatheidea. *K. Svenska Vetenskakad. Handl.* 61: 1-24.

Borradaile, L. A. (1898).—On some crustaceans of the South Pacific—Part 1. Stomatopoda. *Proc. Zool. Soc. Lond.* 1898: 32-8.

Bigelow, R. P. (1895).—Scientific results of explorations by the U.S. Fish Commission Steamer "Albatross" No. XXXII. Report on the Crustacea of the Order Stomatopoda collected by the Steamer "Albatross" between 1885 and 1891 and other specimens in the U.S. National Museum. *Proc. U.S. Nat. Mus.* 17: 489-550.

Bigelow, R. P. (1931).—Stomatopoda of the southern and eastern Pacific Ocean and the Hawaiian Islands. *Bull. Mus. Comp. Zool. Harv.* 72: 105-91.

Chilton, C. (1911).—Revision of the New Zealand Stomatopoda. *Trans. N.Z. Inst.* 43: 134-9.

Chopra, B. (1939).—Stomatopoda. *Sci. Rep. Murray Exped.* 6: 137-81.

Dollfus, R. P. (1938).—Mission Robert Ph. Dollfus en Egypte. Stomatopoda II. *Mém. Inst. Égypt* 37: 185-236.

Eydoux, A. M., and Souleyet, L. (1841).—"Voyage de la 'Bonite'." Zoologie, Vol. 1. Crustacea, pp. 262-6, pl. V (Paris.)

Gravier, C. (1938).—IX. Stomatopoda (1). Les Stomatopodes du Golfe de Suez. *Mém. Inst. Égypt.* 37: 163-83.

Haan, W. de (1844).—Crustacea *in* Siebold's "Fauna Japonica". Atlas. Pl. LI (Leyden.)

Haan, W. de (1849).—Crustacea *in* Siebold's "Fauna Japonica". Text pp. 220-225 (Leyden.)
Hale, H. M. (1924).—Notes on the Australian Crustacea. No. 1. *Rec. S. Aust. Mus.* 2: 491-502.
Hale, H. M. (1929*a*).—Crustacea from Princess Charlotte Bay, North Queensland. The Isopoda and Stomatopoda. *Trans. Roy. Soc. S. Aust.* 53: 33-6.
Hale, H. M. (1929*b*).—Notes on the fauna of Dirk Hartog Island, Western Australia, No. 4, Crustacea. *Trans. Roy. Soc. S. Aust.* 53: 67-70.
Hansen, H. J. (1926).—The Stomatopoda of the Siboga Expedition. Siboga Exped. Livr. 104, Monogr. XXXV.
Haswell, W. H. (1882).—"Catalogue of the Australian stalk and sessile-eyed Crustacea." (Australian Museum: Sydney.)
Hess, W. (1865).—Beiträge zur Kenntniss der Decapoden-Krebse Ost-Australiens. *Arch. Naturgesch.* 31: 127-73.
Holthuis, C. B. (1941).—Biological results of the Snellius Expedition XII. The Stomatopoda of the Snellius Expedition. *Temminckia* 6: 241-294.
Jurich, B. (1904).—Die Stomatopoden de deutschen Tiefsee-Expedition. Wiss. Ergebn. "*Valdivia*". 7: 361-408.
Kemp, S. (1911).—Preliminary descriptions of new species and varieties of Crustacea Stomatopoda in the Indian Museum. *Rec. Indian Mus.* 6: 93-100.
Kemp, S. (1913).—An account of the Crustacea Stomatopoda of the Indo-Pacific region based on the collection in the Indian Museum. *Mem. Indian Mus.* 4: 1-217.
Kemp, S., and Chopra, B. (1921).—Notes on Stomatopoda. *Rec. Indian Mus.* 22: 297-311.
Komai, T. (1927).—Stomatopoda of Japan and adjacent localities. *Mem. Coll. Sci. Kyoto* (B) 3: 307-54.
Lloyd, R. E. (1908).—Remarkable cases of variation. *Rec. Indian Mus.* 2: 30-5.
Miers, E. J. (1880*a*).—On the Squillidae. *Ann. Mag. Nat. Hist.* (5) 5: 1-30.
Miers, E. J. (1880*b*).—On the Squillidae. *Ann. Mag. Nat. Hist.* (5) 5: 108-27.
Miers, E. J. (1880*c*).—On a collection of Crustacea from the Malaysian region. Part IV. Penaeidae, Stomatopoda, Isopoda, Suctoria and Xiphosura. *Ann. Mag. Nat. Hist.* 5: 457-72.
Milne-Edwards, H. (1837).—"Histoire naturelle des Crustacés. Vol. II. (Paris.)
Nobili, G. (1903).—Crostacei di Singapore. *Boll. Mus. Torino* 18 (455): 1-39.
Parisi, B. (1922).—Elenco degli Stomatopodi del Museo de Milano. *Atti Soc. Ital. Milano.* 61: 91-114.
Pocock, R. I. (1893).—Report upon the stomatopod crustaceans obtained by R. W. Basset-Smith Esq., Surgeon R.N., during the cruise in the Australian and China Seas of H.M.S. "Penguin". Commander W. U. Moore. *Ann. Mag. Nat. Hist.* (6) 9: 473-9.
Rathbun, Mary J. (1902).—Japanese stalk-eyed Crustacea. *Proc. U.S. Nat. Mus.* 26: 54-5.
Serène, R. (1952).—Étude d'une collection de Stomatopodes de l'Australian Museum de Sydney. *Rec. Aust. Mus.* 23: 1-24.
Stephenson, W. (1953).—Three new Stomatopoda (Crustacea) from eastern Australia. *Aust. J. Mar. Freshw. Res.* 4: 201-18.
Stephenson, W. (1960).—Notes on Queensland Stomatopoda (Mantis prawns). *Qd. Nat.* 16: 61.
nine species of Squillidae from the collec-
Stephenson, W., and McNeill, F. (1955).—The Australian Stomatopoda (Crustacea) in the collection of the Australian Museum, with a check list and key to the known Australian species. *Rec. Aust. Mus.* 33: 239-65.
Sunier, A. L. J. (1918).—The Stomatopoda of the collection of the "visschery-station" at Batavia. *Contr. Faune Ind. Néerl.* 1: 62-75.
White, A. (1847).—"List of the Specimens of Crustacea in the Collection of the British Museum." pp. 83-85 (London.)
White, A. (1848).—Description of two new species of Crustacea. *Proc. Zool. Soc. Lond.* 1848: 144.
White, A. (1849).—Description of two new species of Crustacea. *Ann. Mag. Nat. Hist.* (2) 4: 381-2.
Wood-Mason, J. (1895).—Figures and descriptions of nine species of Squillidae from the collection in the Indian Museum. (Calcutta).